

AD 23042  
16 April 1971

Materiel Test Procedure 9-3-171  
U. S. Army Armor and Engineer Board

U. S. ARMY TEST AND EVALUATION COMMAND  
COMMODITY SERVICE TEST PROCEDURE

TAMPING MACHINES

1. OBJECTIVE

The objective of this Materiel Test Procedure (MTP) is to set forth the test methodology and testing techniques necessary to determine to what degree tamping machines and their components perform their mission as described in the Materiel Need (MN) or other approved criteria and to determine the suitability of the tamping machines and accompanying maintenance test packages for U. S. Army use.

2. BACKGROUND

The U. S. Army uses tamping machines on construction, support and service tasks to supplement the compaction effort on earthmoving projects. Tampers are used to compact earth in confined areas that are not accessible to other types of compaction equipment.

In order to determine the extent to which their functional performance and military characteristics conform to requirements of the applicable MN or other appropriate criteria, tampers must be tested in the field by personnel representative of those who will actually use and maintain the item under combat conditions.

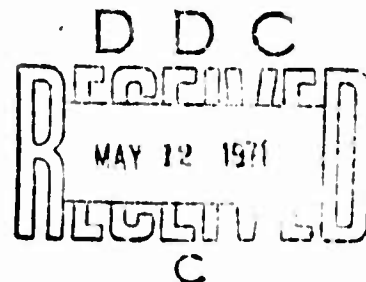
3. REQUIRED EQUIPMENT

- a. Cold weather gear, as required
- b. Warming facilities, as required
- c. Platform scales
- d. Tape measure, 50-foot
- e. Areas suitable for tamping operations
- f. Photographic equipment (still and motion)
- g. Transportation, as required
- h. Communication equipment, as required
- i. Air compressor of appropriate size
- j. Soil density measuring equipment
- k. Medical personnel with evacuation equipment
- l. Other equipment as specified in MTP referenced in

paragraph 4

4. REFERENCES

- A. USATECOM REG 385-6, Verification of Safety of Materiel During Testing.
- B. MTP 10-3-501, Operator Training and Familiarization.



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- C. MTP 2-3-501, Safety Hazards.
- D. MTP 2-3-500, Preoperational Inspection and Physical Characteristics.
- E. MTP 9-3-502, Transportability.
- F. MTP 2-3-516, Human Factors Engineering.
- G. MTP 2-3-502, Maintainability.
- H. MTP 2-3-527, Maintenance Evaluation - Tools and Test Equipment.
- I. MTP 2-3-528, Maintenance Evaluation - Technical Manuscripts and Manuals.
- J. MTP 9-3-503, Reliability.

5. SCOPE

5.1 SUMMARY

This MTP describes procedures to be used in evaluating tamping machines which are outlined as follows:

a. Preparation for Test. Arrange for required facilities and review the safety release to determine the operational limitations, if any, placed on the test item due to safety hazards.

b. Operator Training and Familiarization. Procedures for conducting necessary training and familiarizing personnel with the test item and recording related data.

c. Safety Hazards. A determination of the inherent safety hazards and a continuous evaluation of safety aspects of the test item throughout the service test to support the safety confirmation (safe for intended use) statement required in service test reports.

d. Preoperational Inspection and Physical Characteristics. Pretest inspection, service and repair of the test item as required to ensure that it is in proper condition for test operations, and to determine whether physical characteristics meet specified requirements.

e. Functional Suitability. A series of tests to determine whether the test item can adequately perform the functions for which it was designed.

f. Transportation. A test to determine whether the test item can withstand the shocks, vibration, and extraneous forces and impacts encountered during transporting.

g. Human Factors Engineering. An evaluation to determine the human factors engineering aspects of the test item and its compatibility with the skills and aptitudes of personnel who will operate and service it.

h. Maintenance Evaluation..

- 1) Maintainability. A determination of the maintenance requirements, both scheduled and unscheduled, of the test item and the ease of performing the required maintenance action.
- 2) Tools and Test Equipment. An evaluation to determine whether common and special tools and test equipment furnished for the test item are suitable for the intended purpose and maintenance level.
- 3) Technical Manuscripts and Manuals. An evaluation to determine the adequacy of technical publications provided.

1. Reliability. An evaluation of reliability of the test item to include information regarding expected service life.

## 5.2 LIMITATIONS

This MTP is limited to procedures used to test pneumatic, piston-hammer type, hand-held tamping machines. It does not include test procedures on vibratory compaction equipment. The latter is covered in MTP 9-3-126.

## 6. PROCEDURES

### 6.1 PREPARATION FOR TEST

#### 6.1.1 Personnel

Ensure that test personnel are properly trained to operate the item being tested.

#### 6.1.2 Equipment and Facilities

Ensure that equipment and facilities listed in paragraph 3 and in Materiel Test Procedures referenced in paragraph 4 above are available.

#### 6.1.3 Safety Release

The project officer shall ensure that a safety release (ref 4.A), which includes information pertaining to operational limitations and specific hazards peculiar to the test item, has been received from HQ USATECOM, is understood, and complied with during testing.

### 6.2 TEST CONDUCT

#### 6.2.1 Operator Training and Familiarization

Conduct tests and record data as described in MTP 10-3-501 (ref 4.B).

#### 6.2.2 Safety Hazards

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Conduct a continuing evaluation of all safety aspects of the test item as described in MTP 2-3-501 (ref 4.C).

6.2.3 Preoperational Inspection and Physical Characteristics

Perform inspections, checks, inventories, measurements, weighing, and break-in operations as described in applicable portions of MTP 2-3-500 (ref 4.D).

6.2.4 Functional Suitability

Determine the functional suitability of the test item in accordance with the requirements described in applicable MN or other approved criteria using the procedures in the applicable technical manuals and the following tests.

a. Use the test item to tamp backfill material around culverts, foundations, underground utilities, etc.

NOTE: The tamper is not to come into contact with structures being backfilled.

b. Operate the item at full throttle.

NOTE: Do not operate the test item unless the tamping head (butt) is resting on the ground or on the material to be tamped.

c. Use a compressor of a specified rated capacity (e.g., 105 cubic feet per minute). Operate the compressor at a specified range of pressures in pounds per square inch gauge (e.g., 70 to 100 psig).

d. Operate the test item in positions ranging from vertical to horizontal.

NOTE: During tamping operations, keep the test item moving continuously over the material. Allow the tamper to work at its own speed.

e. During operations, keep the tamping butt (shoe/pad) in a perpendicular position in relation to the material to be tamped.

NOTE: Operating the test item so that the butt hits the material at an angle frequently causes the piston to break where it attaches to the tamping butt.

f. For best results, use the test item on 2- or 3-inch lifts of material.

NOTE: When working in adhesive types of materials, (e.g., clay) wrap the tamper head with burlap to preclude the material from sticking to the head. Do not wrap the head when tamping material such as gravel.

g. Test units equipped with an oil reservoir as follows:

- 1) Fill the test item oil reservoir to capacity.
- 2) Adjust the test item oiler. (see NOTE, h below).
- 3) Operate the test item in material at 90 psig.
- 4) Work the test item continuously for a specified period (e.g., 25 minutes) without stopping operations to re-oil.

h. Test units not equipped with an oil reservoir as follows:

- 1) Insert an air line oiler between the air inlet and the test item.
- 2) Test the item as described in g.2), 3), and 4) above.

NOTE: An oily mist at the exhaust port indicates proper lubrication. A yellow froth at the exhaust port indicates over-lubrication causes packing gland and seal failure.

i. For test items equipped with extension handles, record problems, if any, in attaching the handle and the adequacy of operating in close, confined areas.

NOTE: Handles are necessary on some items to locate the throttle at a convenient height for the operator and to transfer air from the throttle to the tamper.

j. Use the test item to tamp a specified quantity of fill (e.g., 20 cubic yards) to a specified depth (e.g., 6 inches) in a specified period of time (e.g., one hour). Make soil density tests to determine test item effectiveness.

k. Record data on tamping operations. Document operations photographically when appropriate.

#### 6.2.5 Transportability

Conduct tests as described in MTP 9-3-502 (ref 4.E).

#### 6.2.6 Human Factors Engineering

Determine the effectiveness of the man-machine relationship during use of the test item as described in MTP 2-3-516 (ref 4.F).

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6.2.7        Maintenance Evaluation

a. Maintainability. Conduct maintainability evaluation and make required computations for the test item as described in MTP 2-3-502 (ref 4.G) or other appropriate documents.

b. Tools and Test Equipment. Throughout the test, the special tools and test equipment supplied with the test item and tools applicable to the various levels of maintenance will be used. An evaluation of these items will be conducted as described in MTP 2-3-527 (ref 4.H).

c. Technical Manuscripts and Manuals. All equipment publications provided with the test item shall be evaluated as described in MTP 2-3-528 (ref 4.I).

6.2.8        Reliability

Conduct reliability testing and compute the reliability of the test item in accordance with the procedures outlined in MTP 9-3-503 (ref 4.J) or other appropriate documents.

6.3        TEST DATA

6.3.1        Operator Training and Familiarization

Record data for each test participant as described in MTP 10-3-501 (ref 4.B).

6.3.2        Safety Hazards

Record data as described in MTP 2-3-501 (ref 4.C).

6.3.3        Preoperational Inspection and Physical Characteristics

Record data as described in MTP 2-3-500 (ref 4.D). When services, adjustments, and repairs are required, this data will be recorded under the Maintainability subtest of Maintenance Evaluation (paragraph 6.3.7a).

6.3.4        Functional Suitability

Record the following:

- a. Nomenclature of end item
- b. Type of backfill material (e.g., clay, sand, gravel, common earth)
- c. Type structure being backfilled (e.g., foundation, culvert)

- d. Test item throttle setting (i.e., full throttle)
- e. Type and rated capacity of air compressor
- f. Range of pressures under which tamper was tested (e.g., 70, 80, 90, 100 psig)
- g. Problems, if any, in operating in various positions from vertical to horizontal
- h. Thicknesses of material lifts by type material
- i. Necessity, if any, for wrapping tamper butt
- j. Type oil reservoir and capacity
- k. Capability to operate specified time without re-oiling
- l. Instances of over-lubrication, if any
- m. Adequacy of special tool to attach and remove butt
- n. Instances, if any, of loose butts.
- o. Adequacy of extension handle, if applicable
- p. Capability of test item to tamp a specified quantity of fill to a specified depth and density in a specified period of time

6.3.5 Transportability

Record data as described in MTP 9-3-502 (ref 4.E).

6.3.6 Human Factors Engineering

Record data as described in MTP 2-3-516 (ref 4.F).

6.3.7 Maintenance Evaluation

a. Maintainability. Record data and make the required computations as described in MTP 2-3-502 (ref 4.G).

b. Tools and Test Equipment. Record data as described in MTP 2-3-527 (ref 4.H).

c. Technical Manuscripts and Manuals. Record data as described in MTP 2-3-528 (ref 4.I).

6.3.8 Reliability

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Record data and make the required computations described in  
MTP 9-3-503 (ref 4.J0).

#### 6.4 DATA REDUCTION AND PRESENTATION

a. All data obtained by inspection, observation, questionnaires, and testing, including photographs, shall be analyzed and presented in a manner to indicate whether the test item meets the established criteria.

b. A safety confirmation shall be presented in accordance with USATECOM REG 385-6 (ref 4.A).



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13. ABSTRACT  This procedure defines the method used for evaluating the suitability of pneumatic, piston hammer type, handheld tamping machines for accomplishing compaction of field material adjacent to various structures.			

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